

WHAT IS CLAIMED IS:

Sub  
a1  
5 1. An air conditioning apparatus for a vehicle having a passenger compartment, said air conditioning apparatus comprising:

a case forming an air passage; and

a cooling heat exchanger for cooling air passing therethrough, disposed in said case, wherein:

10 said cooling heat exchanger has a plurality tubes extending in a longitudinal direction, through which a fluid flows;

15 said cooling heat exchanger is disposed in said case to be inclined from a horizontal direction by a predetermined angle so that air is introduced into said cooling heat exchanger from below and flows upwardly;

20 said cooling heat exchanger is inclined in the same direction as the longitudinal direction of said tubes; and

25 said cooling heat exchanger is disposed so that a flow direction of air flowing into a lower side of said cooling heat exchanger is approximately perpendicular to the longitudinal direction of said tubes.

2. The air conditioning apparatus according to claim 1, wherein:

30 said flow direction of air is in a vehicle width direction; and

said longitudinal direction of said tubes is in a vehicle front-rear direction.

Sub C2  
3. The air conditioning apparatus according to claim 2, wherein:

5 said cooling heat exchanger includes a tank portion for distributing fluid into said tubes and for joining fluid from said tubes, said tank portion being provided at least on one end side of each tube in the longitudinal direction;

10 said tank portion includes a joint portion having an inlet for introducing fluid into said cooling heat exchanger and an outlet for discharging fluid from said cooling heat exchanger; and

20 said joint portion is disposed on an end surface of said tank portion in the vehicle width direction.

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4. The air conditioning apparatus according to claim 2, wherein said cooling heat exchanger is disposed to be inclined in the vehicle front-rear direction to have a first end at a vehicle front side and a second end at a vehicle rear side in the vehicle front rear direction, said first end of said cooling heat exchanger being arranged at a position higher than said second end thereof in a vehicle up-down direction.

Sub C3  
25 5. The air conditioning apparatus according to claim 4, wherein:

30 said case has a bottom surface portion on a lower side of said cooling heat exchanger;

35 said bottom surface portion is inclined to correspond

to said cooling heat exchanger so that a vehicle front side of said bottom surface portion becomes higher than a vehicle rear side thereof; and

5 said case has a drain hole for draining condensed water generated in said cooling heat exchanger, at a lowest position of said bottom surface portion.

6. The air conditioning apparatus according to claim 5, wherein:

10 said case has an air inlet through which air blown by said blower unit flows into the lower side of said cooling heat exchanger in said flow direction; and

15 said air inlet is formed between said cooling heat exchanger and said bottom surface portion along each inclination of said cooling heat exchanger and said bottom surface portion.

7. The air conditioning apparatus according to claim 1, further comprising:

20 a heating heat exchanger for heating air from said cooling heat exchanger, said heating heat exchanger being disposed on an upper side of said cooling heat exchanger at a vehicle front side so that a bypass passage through which air bypasses said heating heat exchanger is formed at a vehicle rear side of said heating heat exchanger; and

25 an air mixing door, disposed between said cooling heat exchanger and said heating heat exchanger, for adjusting a

ratio between an amount of air passing through said heating heat exchanger and an amount of air passing through said bypass passage,

wherein said case has a face opening portion for blowing air toward an upper side of the passenger compartment, at a vehicle rear side on an upper portion of said case.

8. An air conditioning apparatus for a vehicle having a passenger compartment and an engine compartment partitioned by a dashboard having a floorboard, said air conditioning apparatus comprising:

a blower unit for blowing air; and

an air conditioning unit for adjusting temperature of air blown into the passenger compartment of the vehicle from said blower unit, wherein:

said air conditioning unit includes

a case forming an air passage, and

a cooling heat exchanger, disposed in said case, for cooling air passing therethrough;

said cooling heat exchanger is disposed in said case to be inclined from a horizontal direction by a predetermined angle so that air is introduced into said cooling heat exchanger from below and flows upwardly;

said cooling heat exchanger has a plurality of tubes, extending in a longitudinal direction, through which fluid flows;

said cooling heat exchanger is inclined in the same

direction as the longitudinal direction of said tubes; and

said cooling heat exchanger is disposed so that the longitudinal direction of said tubes is in a vehicle front-rear direction and a flow direction of air blown from said blower unit into a lower side of said cooling heat exchanger is in a vehicle width direction.

9. The air conditioning apparatus according to claim 8, wherein:

said air conditioning unit is disposed at a center portion on a front side of the passenger compartment; and

said blower unit is disposed to be shifted from said air conditioning unit at a side in the vehicle width direction.

10. The air conditioning apparatus according to claim 8, wherein:

said cooling heat exchanger includes a tank portion for distributing fluid into said tubes and for joining fluid from said tubes, said tank portion being provided at least on one end side of each tube in the longitudinal direction;

said tank portion includes a joint portion having an inlet for introducing fluid into said cooling heat exchanger and an outlet for discharging fluid from said cooling heat exchanger; and

said joint portion is disposed on an end surface of said tank portion in the vehicle width direction.

11. The air conditioning apparatus according to claim 8, wherein said cooling heat exchanger is disposed to be inclined in the vehicle front-rear direction to have a first end at a vehicle front side and a second end at a vehicle rear side in the vehicle front-rear direction, said first end of said cooling heat exchanger being arranged at a position higher than said second end thereof in a vehicle up-down direction.

12. The air conditioning apparatus according to claim 11, wherein:

said case has a bottom surface portion on a lower side of said cooling heat exchanger;

said bottom surface portion is inclined to correspond to said cooling heat exchanger so that a vehicle front side of said bottom surface portion becomes higher than a vehicle rear side thereof; and

said case has a drain hole for draining condensed water generated in said cooling heat exchanger, at a lowest position of said bottom surface portion.

13. The air conditioning apparatus according to claim 11, wherein:

said case has a bottom surface portion between said cooling heat exchanger and said floorboard;

said bottom surface portion is inclined to correspond to said cooling heat exchanger so that a vehicle front side of

said bottom surface portion becomes higher than a vehicle rear side thereof; and

the floorboard is inclined to correspond to said cooling heat exchanger so that a vehicle front side of the floorboard becomes higher than a vehicle rear side thereof.

14. The air conditioning apparatus according to claim 12, wherein:

said case has an air inlet through which air blown by said blower unit flows into a lower side of said cooling heat exchanger in said flow direction; and

said air inlet is formed between said cooling heat exchanger and said bottom surface portion along each inclination of said cooling heat exchanger and said bottom surface portion.

15. The air conditioning apparatus according to claim 8, wherein said blower unit includes

an inside/outside air switching unit having an outside air inlet for introducing air outside the passenger compartment, an inside air inlet for introducing air inside the passenger compartment, and an inside/outside switching door for opening and closing said outside air inlet and said inside air inlet, and

a blower for blowing air introduced from said inside/outside air switching unit, said blower being disposed at a downstream air side of said inside/outside air switching

a  
unit in such a manner that a rotation axis of said blower is  
approximately <sup>horizontal</sup> ~~in the vehicle front-rear direction~~.

5 16. The air conditioning apparatus according to any  
one of claims 15, wherein said inside/outside air switching  
unit is disposed at a vehicle front side of said blower in the  
vehicle front-rear direction.

10 17. The air conditioning apparatus according to claim  
8, further comprising:

15 a heating heat exchanger for heating air from said  
cooling heat exchanger, said heating heat exchanger being  
disposed on an upper side of said cooling heat exchanger at a  
vehicle front side so that a bypass passage through which air  
bypasses said heating heat exchanger is formed at a vehicle  
rear side of said heating heat exchanger; and

20 an air mixing door, disposed between said cooling heat  
exchanger and said heating heat exchanger, for adjusting a  
ratio between an amount of air passing through said heating  
heat exchanger and an amount of air passing through said  
bypass passage,

25 wherein said case has a face opening portion for  
blowing air toward an upper side of the passenger compartment,  
at a vehicle rear side on an upper portion of said case.